IS 3164 (1980): Oil Pressure Lamps, Hanging Type [MED 26: Oil Burning Appliances]

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(Reaffirmed 2002)

Indian Standard

SPECIFICATION FOR OIL PRESSURE LAMPS, HANGING TYPE

(First Revision)

UDC 683·8 : 628·944

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

SPECIFICATION FOR OIL PRESSURE LAMPS, HANGING TYPE

(First Revision)

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(*Continued on page* 2)

AMENDMENT NO. 1 FEBRUARY 2009
TO
IS 3164 : 1980 SPECIFICATION FOR OIL PRESSURE LAMPS, HANGING TYPE

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(*Page* 12, *clause* **5.15.1**, *line* 1) — Substitute 'Acrylonitrile-Butadiene Rubber (NBR)' *for* 'neoprene

(MI 26)

Reprography Unit BIS New Delhi India

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Indian Standard

SPECIFICATION FOR OIL PRESSURE LAMPS, HANGING TYPE

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 25 August 1980, after the draft finalized by the Oil Burning Appliances (Pressure Type) Sectional Committee had been approved by the Consumer Products and Medical Instruments Division Council.

0.2 This standard was first published in 1965. The first revision of this standard has been necessitated as a result of experience gained through its implementation by the industry as well as the users during the past years. In this revision a number of provisions relating to the materials, finish and other requirements of the important components have been incorporated in order to make the standard up-to-date and more acceptable to its users.

0.3 This standard specifies the requirement for two sizes of oil pressure lamps (hanging type). These pressure lamps differ from the oil pressure lanterns for which a separate standard, namely, IS : 1384-1977* has been published.

0.4 Mantles play a very significant part in the performance of oil pressure lamps. The performance requirements for mantles have been covered in IS : 2788-1964† whereas the mantle holder which is another important component of oil pressure lamp has been separately covered in IS : 4957-1980‡.

0.5 Since long ISO metric screw threads have been introduced in the Indian industry and by now they are widely acknowledged as standard screw threads. Therefore, it has been decided to replace the SI metric threads as previously specified in this standard by ISO metric screw threads (*see* IS : 4218-1967§). However in view of the fact that the

*Specification for oil pressure lanterns (*revised*).
†Specification for gas mantles.
‡Specification for mantle holders, nozzle type (*revised*).
§ISO metric screw threads.

Industry has not yet fully adopted ISO metric threads and many of them may find it difficult to change over to ISO metric system all at once, therefore the corresponding values of threads in SI units have also been retained and shown as alternate values. It is expected that oil pressure appliances industry would make sincere efforts in swift change over to ISO metric screw threads.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard specifies the requirements for two sizes of hanging type, oil pressure lamps of 400 and 200 candelas, burning kerosine under the working pressure not exceeding 195 kN/m^2 (2·0 kgf/cm^2).

2. NOMENCLATURE

2.1 For the purpose of this standard, the nomenclature of the different parts shall be as indicated in Fig. 1.

3. SIZES

3.1 The two sizes of oil pressure lamps along with their rated luminous intensity and nominal weight (with globe) shall be as under:

Rated Luminous Intensity	*Nominal Weight (with Globe)*	*Overall Height* mm
cd	kg	
200	4·6	440 ± 15
400	6·7	585 ± 15

3.2 The lamps shall be designated in term of their rated luminous intensity.

4. MATERIALS

4.1 The materials used in the manufacture of different parts of the oil pressure lamp shall be such that they ensure safe handling and good performance of lamp throughout its reasonable life.

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*Rules for rounding off numerical values (*revised*).

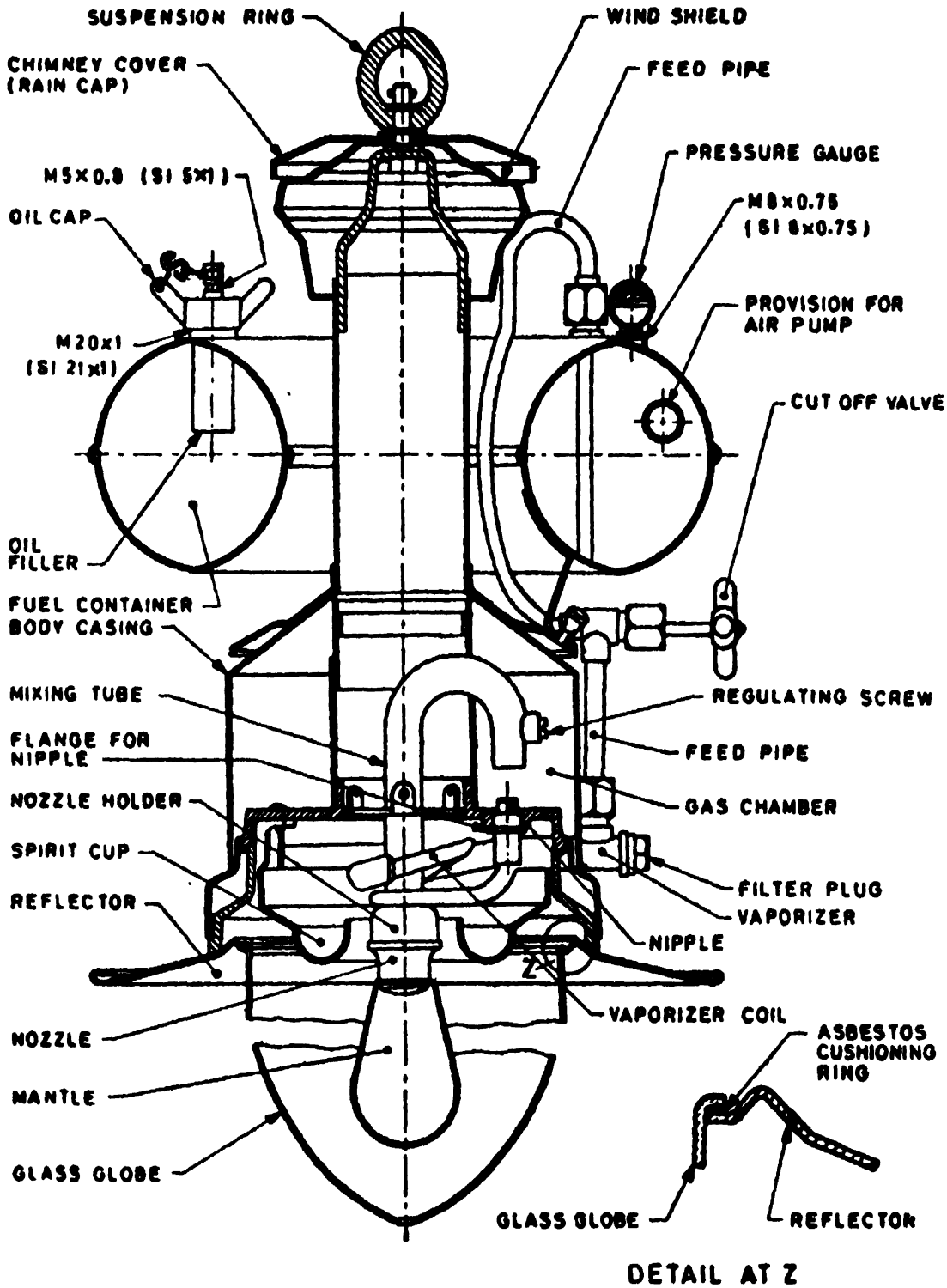


FIG. 1 OIL PRESSURE LAMP, HANGING TYPE, TYPICAL

4.2 The following components of the lamp shall be made from materials specified against each:

Sl No.	*Component*	*Fig. Reference*	*Material*
i)	Fuel container (lower and upper part of tank), inner collar	1	Steel sheet conforming to IS : 513-1975* DD type annealed, thickness 0·71 mm
ii)	Vaporizer		
	a) Nipple	1	Brass rod conforming to IS : 319-1974†
	b) Vaporizer coils	1	Seamless brass tube conforming to alloy No. 2 of IS : 407-1966‡
	c) Filter plug	1	Brass rod conforming to IS : 319-1974†
	d) Vaporizer body	1	Brass casting hot stamped conforming to IS : 304-1961§
iii)	Feed-pipe assembly		
	a) Feed-pipe	1	Seamless brass tube conforming to alloy No. 2 of IS : 407-1966‡
	b) Nuts	1	Brass rod conforming to IS : 319-1974†
	c) Valve body and handle	1	Brass casting hot-stamped conforming to IS : 304-1961§
	d) Spindle valve	1	Bright steel rod conforming to IS : 7270-1974‖

*Specification for cold rolled carbon steel sheets (*second revision*).
†Specification for free-cutting brass bars, rods and sections (*third revision*).
‡Specification for brass tubes for general purposes (*second revision*).
§Specification for high tensile brass ingots and castings (*revised*).
‖Specification for bright bars standard quality.

Sl No.	*Component*	*Fig. Reference*	*Material*
iv)	Mixing tube assembly:		
	a) Mixing tube	1 and 4	Seamless brass tube conforming to alloy type 2 given in IS : 407-1966*
	b) Regulating screw and socket	1	Brass rod conforming to IS : 319-1974†
	c) Nozzle holder and bracket for mixing	1	Brass casting conforming to IS : 304-1961‡
v)	Globe	1	Heat-resisting glass (*see* **5.10**)

4.3 Typical materials used in the manufacture of other components are given in Appendix A for the guidance of manufacturers.

5. DESIGN, DIMENSIONS AND CONSTRUCTION

5.1 The lamp shall generally conform to the design shown in Fig. 1. The dimensions and threads for nozzle, holder, mixing tube and air-pump shall be as shown in Fig. 2, 3 and 4 respectively.

5.2 Fuel Container — The lower and upper parts of the fuel container shall be either pressed or spun. The two parts shall be joined with double lock joints and securely soldered.

5.2.1 The capacity of the fuel container shall be as follows:

Type of Lamp	*Capacity*
200 cd	2 000 ml
400 cd	4 500 ml

5.2.2 Each fuel container shall pass the test specified in **7.1**. In addition, fuel containers shall be tested when filled with fuel through the filler opening and when standing on a level surface. They shall be leakproof when tested at 2·1 bar or at the pressure reached by the pump to the appliance after one minute pumping at 60 strokes per minute, whichever is the higher. If a safety valve is fitted as part of the appliance, the test shall be carried out with the safety valve omitted and blanked off. During manufacture, samples of the fuel container shall be leakproof

*Specification for brass tubes for general purposes (*second revision*).
†Specification for free-cutting brass bars, rods and sections (*third revision*).
‡Specification for high tensile brass ingots and castings (*revised*).

when tested at the lesser of the two pressures P_1 and P_2 defined below, if greater than the two pressures referred to above.

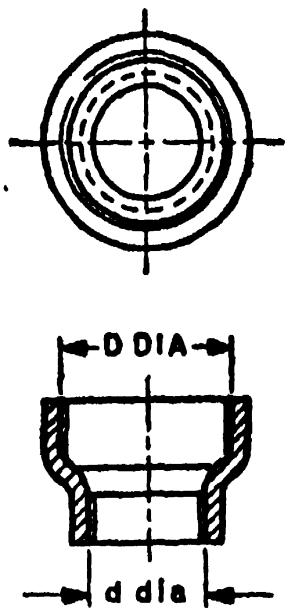
$$P_1 \text{ (in bar)} = \frac{1\,330 \times \text{Mechanical advantage}}{\text{Internal cross-sectional area of pump in mm}^2}$$

$$P_2 \text{ (in bar)} = 1{\cdot}03 \times \text{Compression ratio of the pump}$$

NOTE 1 — The mechanical advantage is the factor by which the force applied to the pump handle is multiplied between this point and the pump piston.

NOTE 2 — SI threads as mentioned in Brackets in Fig. 1, 2, 3 & 4 are permitted to continue for a period of two years since the publication of the standard.

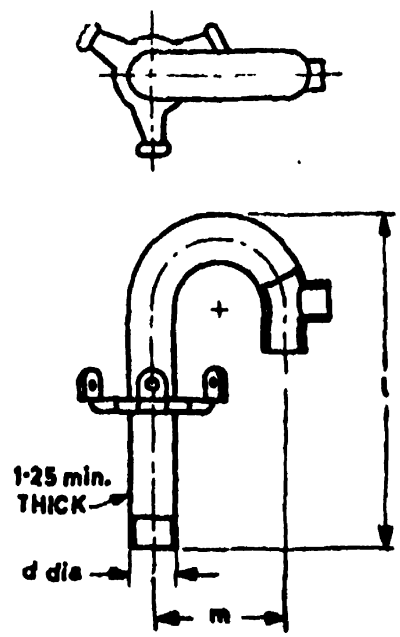
NOTE 3 — The threads on pipes may be truncated up to 25 percent of its depth.



Type of Lamp	*D* dia	*d* dia
400 cd	M 27 × 2 or (SI 27 × 1·5)	M 16 × 1 or (SI 16 × 1)
200 cd	M 16 × 2 or (SI 17·5 × 1·5)	M 14 × 1 or (SI 13 × 1)

All dimensions in millimetres.

FIG. 2 NOZZLE HOLDER



Type of Lamp	*l*	*m*	*d* dia
400 cd	121	51	M 16 × 1 or (SI 16 × 1)
200 cd	89	30	M 14 × 1 or (SI 13 × 1)

All dimensions in millimetres.

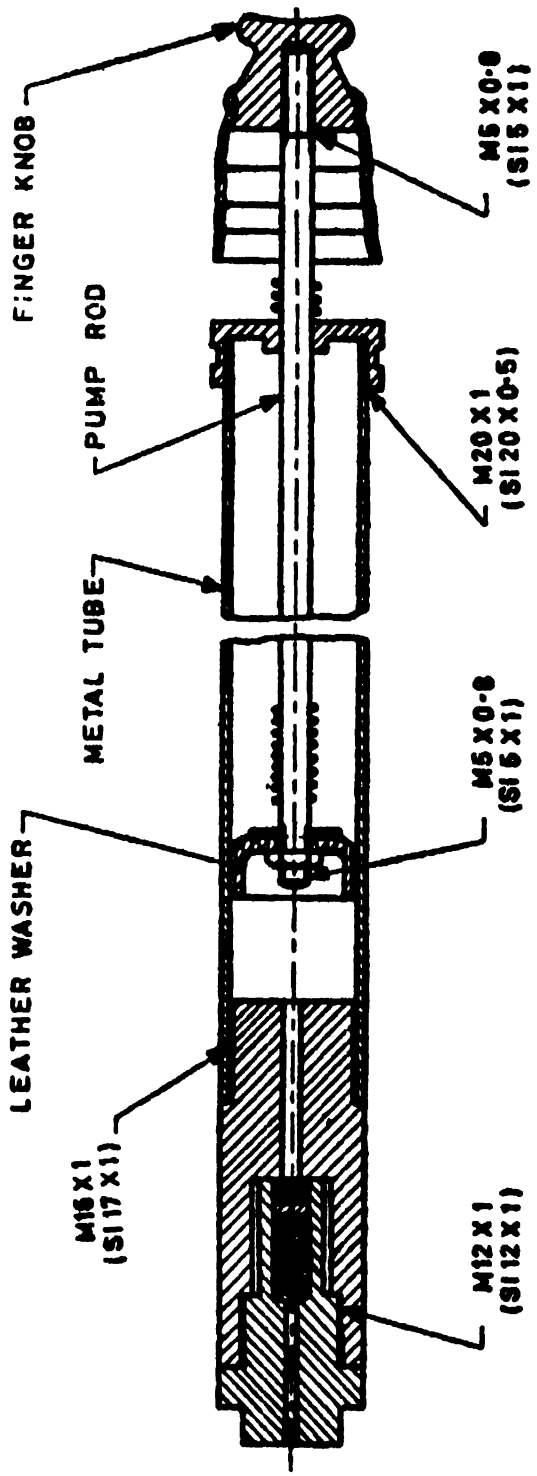
FIG. 3 MIXING TUBE

5.3 Vaporizer Unit — All joints in the vaporizer, which are exposed to high temperature, shall be brazed with a brazing alloy having a melting point of 800 to 850°C.

5.3.1 The vaporizer units, when individually tested during their manufacture, should be perfectly leakproof at 245 kN/m² (2·5 kgf/cm²).

5.3.2 *Nipple* — The inside of the nipple shall be free from burrs, the nominal diameter of the nipple orifice shall be as under:

Type of Lamp	*Nominal Diameter* mm
200 cd	0·22
400 cd	0·25



All dimensions in millimetres.

FIG. 4 AIR PUMP, TYPICAL

5.4 Pump

5.4.1 The pump shall be of sound construction and shall be capable of developing and retaining a pressure of 245 kN/m² (2·5 kgf/cm²). The non-return valve and the pump washer assembly shall be detachable.

5.5 Mantle — It shall conform to IS : 2788-1964* (*see* **0.4**).

5.6 Mantle Holder (Nozzle) — Mantle holder shall conform to IS : 4957-1980† (*see* **0.4**).

5.7 Pressure Gauge

5.7.1 Pressure gauge shall be of Bourdon tube type in which Bourdon tube used shall be seamless.

5.7.2 The dial shall be graduated to a minimum of 295 kN/m² (3 kgf/cm²). A red mark shall indicate the pressure at which the lamp is intended to work, namely, 195 kN/m² (2·0 kgf/cm²).

5.8 Cut-Off Valve — The cut-off valve in the feed-pipe shall be capable of completely cutting-off supply of oil to vaporizer at the maximum pressure, that is, 295 kN/m² (3·0 kgf/cm²).

5.8.1 The fuel container shall be fitted with a means of releasing the pressure within the container safely and quickly, whilst the lamp is alight.

5.9 Oil Filler Cap — The oil filler cap assembly shall be leakproof at a pressure of 3 kgf/cm² and capable of withstanding, when fitted to the fuel container, the test specified in **7.1**.

5.10 Globe

5.10.1 The thickness of globe shall be reasonably uniform throughout. It shall be free from cracks and shall be substantially free from stones, blisters, air bubbles, cords and other visual defects.

5.10.2 The globe shall be transparent and when determined by the method described under Appendix B, the absorption of light by the globe shall not exceed 5 percent. The globe shall withstand the thermal shock test when tested in accordance with IS : 6506-1972‡.

5.10.3 Globe shall rest on the reflector provided with an asbestos cushioning ring.

5.11 Reflector — Reflector shall be hinged to the body on one side and attached with a lug and screw to the other side.

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*Specification for gas mantles.
†Specification for mantle holders, nozzle type (*revised*).
‡Methods for thermal shock tests on glassware.

5.12 The gas chamber (where the mixing of gas with the air takes place) shall be situated in such a way that the gas-air mixture does not get ignited by the burning mantle.

5.13 The open end of the mixing tube shall be true and concentric with the orifice of the nipple and in perfect alignment with the gas jet passing through the nipple.

5.14 Body Casing, Wind Shield and Chimney Cover (Rain Cap)— Requisite ventilators shall be provided at the lower part of the hood for supply of air to gas coming through the vaporizer into the air pocket and at the upper part for the outlet of combustion.

5.14.1 The wind shield and chimney cover (rain-cap) shall be detachable from the body casing.

5.15 Washers

5.15.1 The washers for oil filler cap shall be made from neoprene or other equally suitable material which is resistant to heat and kerosine oil. It shall not become tacky or swollen when kept immersed in kerosine oil at 60°C for 24 hours and shall be capable of giving leakproof seal after the above test.

5.15.2 Pump washer shall be made from curried buffallo leather or other equally suitable material and shall be treated to avoid hardening and cracking.

5.15.3 *Lead Washer* — Suitable lead washers shall be used at the joints between:

a) pressure gauge and oil container; and

b) pump and its valve.

5.16 Interchangeable Parts — The following parts shall be interchangeable:

a) Burner unit, complete;
b) Nipple;
c) Spirit cup;
d) Oil filler cap;
e) Pressure release screw;
f) Mixing tube;
g) Nozzle;
h) Pressure gauge;
j) Pump rod assembly;
k) Glass globe; and
m) Reflector.

6. FINISH

6.1 The upper and lower portions and collar comprising the oil container shall be properly pickled and all rust removed. They shall then be tin plated to 0·03 mm thickness on both sides before assembling the container. The container shall be given a coat of paint conforming to Type C of IS : 341-1973*.

6.2 The body casing, wind shield, chimney cover (rain-cap), casing ring, chimney part, door and reflector top shall have a coat of suitable black vitreous enamel to withstand temperature of the combustion zone and exhaust gas.

6.3 The reflecting surface of the reflector shall have a coat of white vitreous enamel.

7. TESTS

7.1 Air Pressure Test — Each fuel container fitted with pump valve and oil cap shall be tested to an internal air pressure of 295 kN/m^2 (3 kgf/cm^2). It shall not show any sign of leakage or deformation.

7.2 Safety Pressure Test — When subjected to a hydraulic pressure of 980 kN/m^2 (10 kgf/cm^2) the tank shall be perfectly leakproof at all joints and solder lines. At the end of this test, there shall be no permanent deformation of the tank. Slight leakage of the hydraulic fluid shall, however, be permissible provided the pressure is capable of being maintained for a duration of not less than five minutes.

7.3 Bursting Pressure Test — One fuel tank in a lot of 250 shall be selected at random and subjected to a hydraulic pressure of 1 370 kN/m^2 (14 kgf/cm^2). The fuel tank shall neither burst nor unduly distort. Slight leakage of the hydraulic fluid shall, however, be permissible, provided the pressure is capable of being maintained for a duration of not less than five minutes.

7.4 Burning — The lamp shall burn without appreciable flickering and there shall be no emission of unburnt gas.

7.5 Luminous Intensity — The mean horizontal luminous intensity of the lamps when determined by the method described in Appendix B shall be not less than the rated luminous intensity of the lamp given in candelas subject to a minus tolerance of 10 percent of the rated figure.

7.6 Duration of Burning for One Fill — With the tank filled to 75 percent of its capacity, the lamp shall be subjected to the burning test.

*Specification for black japan, types A, B and C (*first revision*).

During the period of test, the pressure shall be maintained at 195 kN/m² (2 kgf/cm²). The duration of burning shall be not less than the following:

200 cd lamps	15 hours
400 cd lamps	18 hours

7.7 Lighting Efficiency — The lighting efficiency of lamps, that is, the ratio of the mean horizontal luminous intensity to the weight in grams of fuel burned per hour, shall be not less than 2·5 for both types of lamps.

7.8 Surface Temperature — The surface temperature of any part of the lamp that it may be necessary to touch during the operation of the lamp shall not exceed 60°C.

7.9 Storm Proofness — The lamp shall function properly when exposed to a wind with a velocity of 70 km/h for a period of not less than 5 minutes.

8. MARKING

8.1 Each lamp shall be stamped with its luminous intensity, the name of the manufacturer or his registered trade-mark and the country of origin.

8.1.1 The oil pressure lamp may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. PACKING

9.1 Each lamp shall be packed in a strong corrugated cardboard box. The globe shall be packed separately by adequate cushioning in a strong cardboard box.

10. SPARES AND ACCESSORIES

10.1 Each lamp shall be supplied with a spirit can, a spanner, a nipple, three prickers, an oil-cap washer, a pump washer, a mantle, a filler plug, a key, a funnel and a pamphlet containing directions for use.

APPENDIX A

(*Clause* 4.3)

MATERIALS COMMONLY USED IN THE MANUFACTURE OF COMPONENTS OF OIL PRESSURE LAMPS HANGING TYPE, OTHER THAN THOSE SPECIFIED IN 4.2

Component	*Recommended Material*
i) Pump:	
a) Pump barrel	Seamless brass tube conforming to alloy No. 2 of IS : 407-1966*, 0·80 mm thick
b) Pump rod, valve body and bolt	Brass rod conforming to IS : 319-1974†
c) Pump cap	Cast brass conforming to IS : 304-1961‡
d) Valve spring	Phosphor bronze or spring steel wire
ii) Reflector and spirit cup	Enamel quality steel sheet annealed, 0·71 mm thick, conforming to IS : 513-1973§
iii) Wind shield, chimney cover (rain-cap), door and chimney	Steel sheet 0·71 mm thick conforming to IS : 226-1975‖
iv) Suspension ring	Mild steel rod, 7 mm dia, conforming to IS : 226-1975‖
v) Bolt and nut with split pin	Mild steel rod, 8 mm dia, conforming to IS : 226-1975‖
vi) Oil filler cap with valve and socket on the fuel container	Cast brass conforming to IS : 304-1961‡
vii) Burner base	Cast iron
viii) Fixing screws	Brass rod conforming to IS : 319-1974†

*Specification for brass tubes for general purposes (*second revision*).
†Specification for free-cutting brass bars, rods and sections (*third revision*).
‡Specification for high tensile brass ingots and castings (*revised*).
§Specification for cold rolled carbon steel sheets (*second revision*).
‖Specification for structural steel (standard quality) (*fourth revision*).

APPENDIX B

(*Clause* 7.5)

METHOD FOR THE MEASUREMENT OF MEAN HORIZONTAL LUMINOUS INTENSITY

B-1. PHOTOMETRIC EQUIPMENT

B-1.1 The mean horizontal luminous intensity of the lamp shall be measured against a metal filament sub-standard electric lamp, mounted on a standard photometer bench, with a suitable form of photometer head.

B-2. PROCEDURE FOR MEASUREMENT

B-2.1 The fuel container of the lamp shall contain approximately 75 percent of the amount of fuel held when full, and the globe of the lamp shall be cleaned before the commencement of the test.

B-2.2 The lamp shall be lit and allowed to burn at the working pressure of 195 kN/m^2 (2 kgf/cm^2) for at least half-an-hour to attain a steady condition.

B-2.3 The lamp shall be mounted on a table fixed in one of the carriages of the photometer bench. The middle portion of the mantle, photometer head, and the substandard electric lamp, shall be in the same horizontal plane and the photometer head shall be placed perpendicular to the incident light from the mantle flame head. The sub-standard lamp and the photometer head shall be kept fixed at any convenient position on the bench.

B-2.4 The lamp shall be moved to and fro on one side of the photometer head, until the position of the balance is found. Measurement shall be made in horizontal plane by changing the position of lamp in four directions, at right angles to the axis of the appliance, differing by 90°. A number of readings in each direction shall be taken and the average of all these measurements in four directions shall be taken as the final value.

B-2.5 The temperature and the relative humidity of the test room shall be reported along with the tests.

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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